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GB 1178317
GB 1029949
GB 225272
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(54) Mirror for Motor Vehicles

(57) Uniform heating of vehicle mirrors is achieved by means of a plate or foil heating element 6 parallel to and against the reflecting surface. The mirror glass, reflecting surface and heating element are housed in a frame 1, attached to a mounting foot 2. Electrical connection may be made by wires 9, 10 connected to U-shaped contact strips 7, 8. The heating foil or plate may be an electrically-conducting elastomer or a metal or metallized plastics or paper foil which may be slotted to increase its electrical resistance or may be a metal reflecting surface or its covering metal layer.

The drawings originally filed were informal and the prints here reproduced are taken from later filed formal copies.

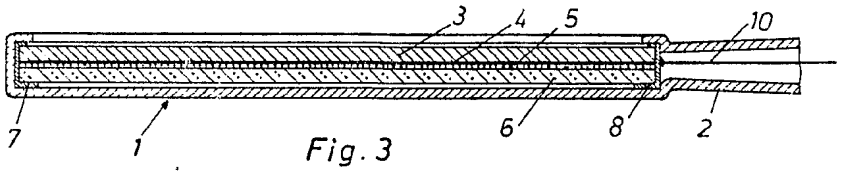

Fig. 3

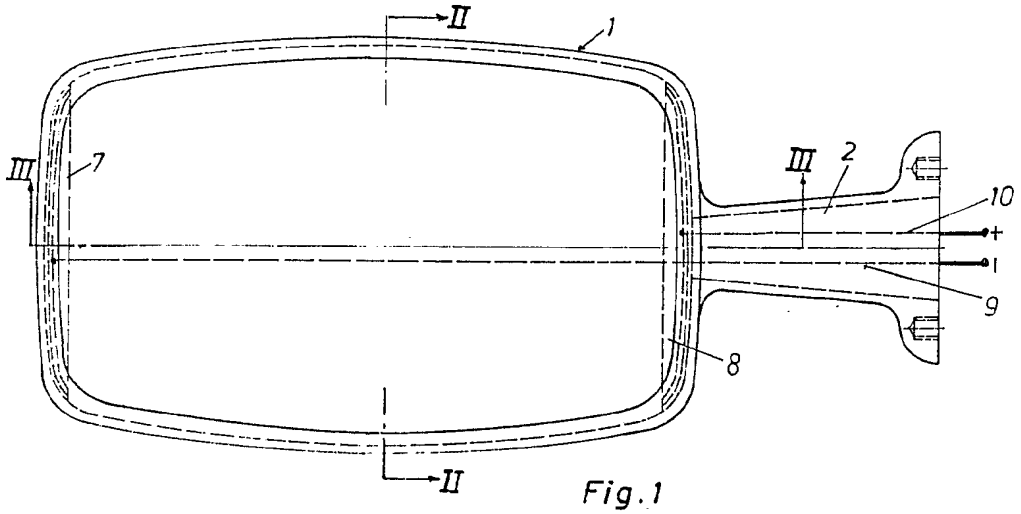

Fig. 1

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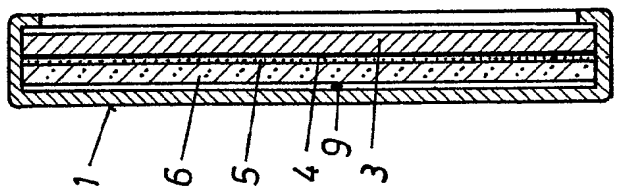

Fig.2

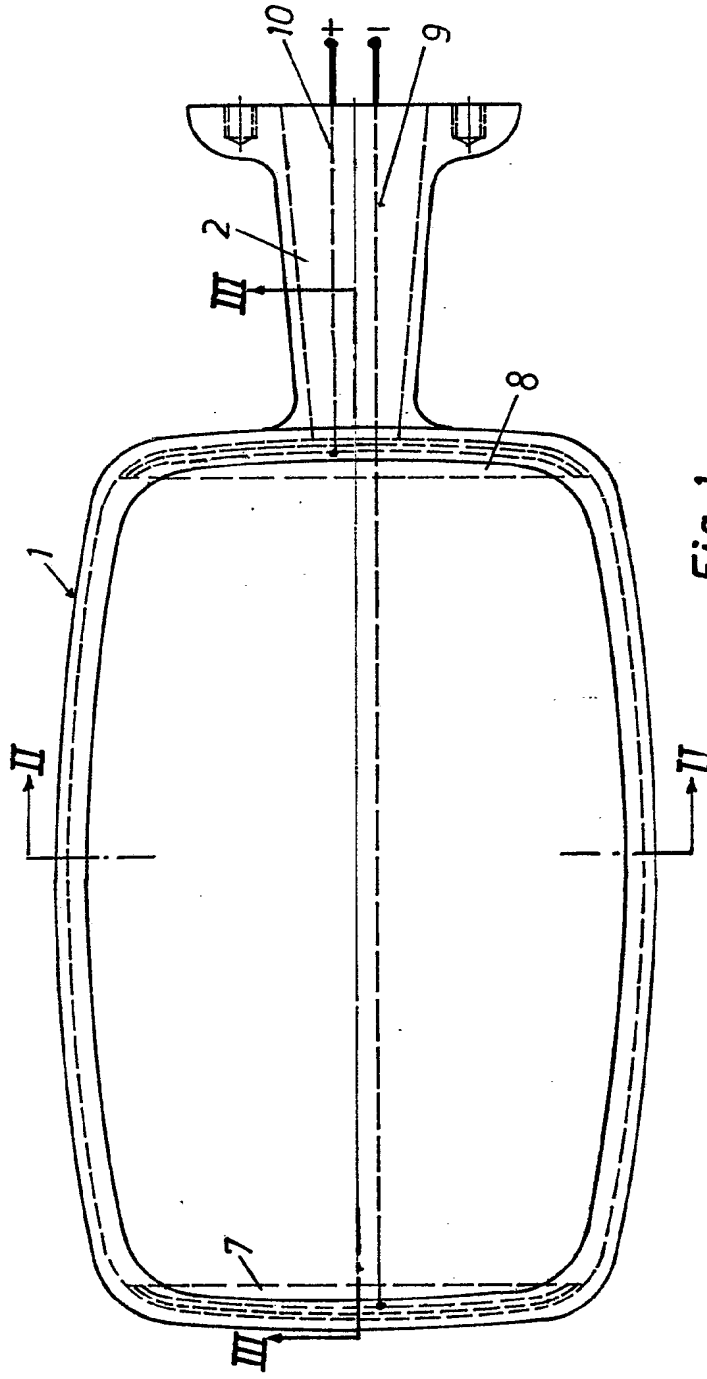

Fig.1

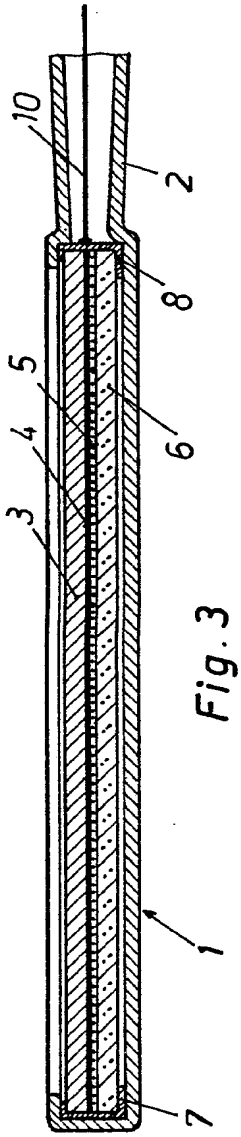

Fig.3

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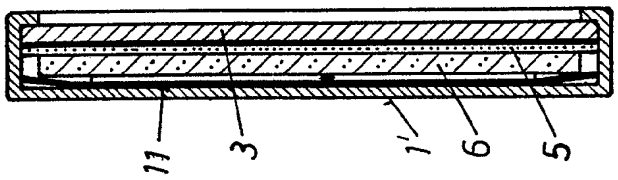

Fig.5

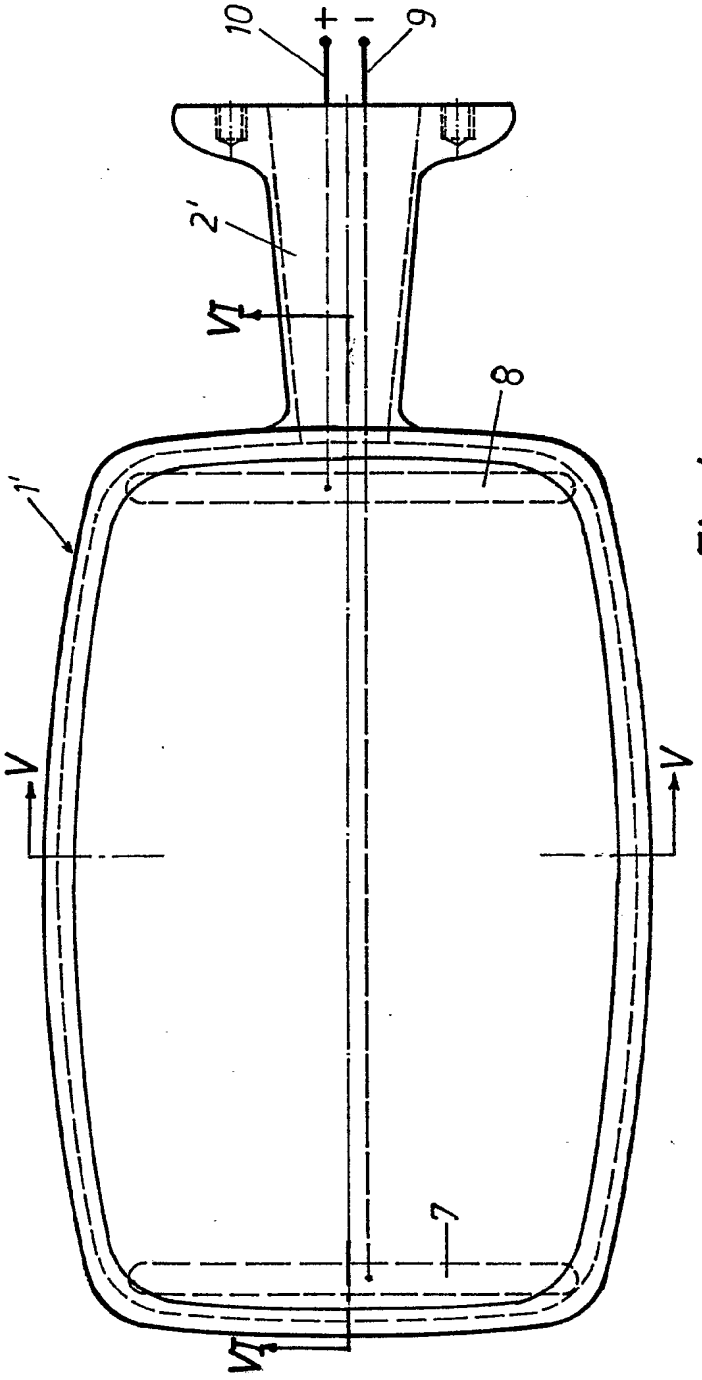

Fig.4

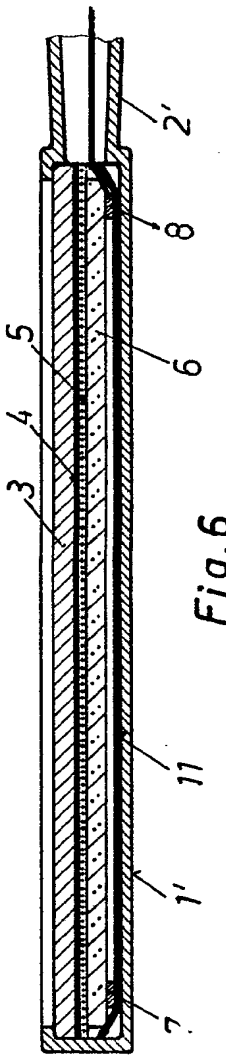

Fig.6

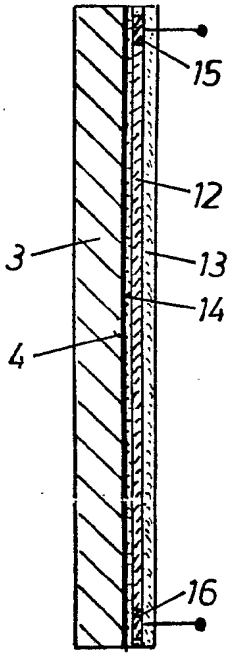

Fig.7

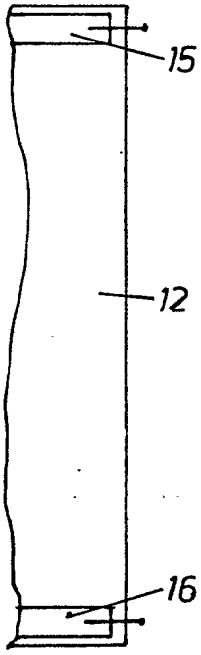

Fig. 8

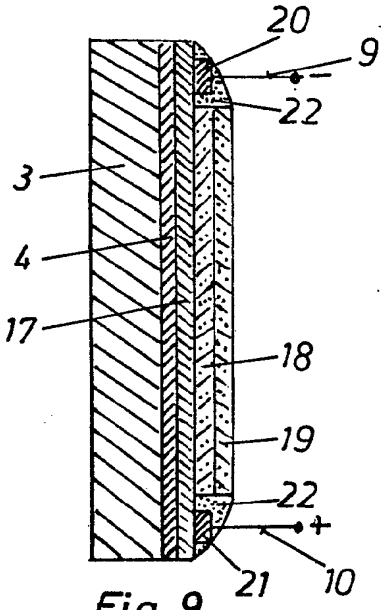

Fig. 9

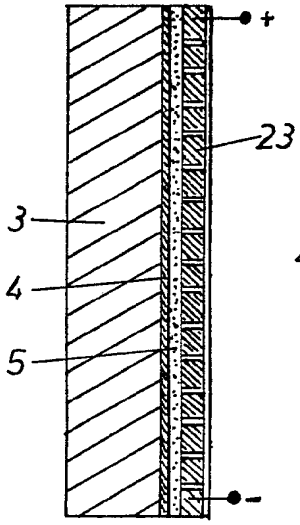

Fig. 10

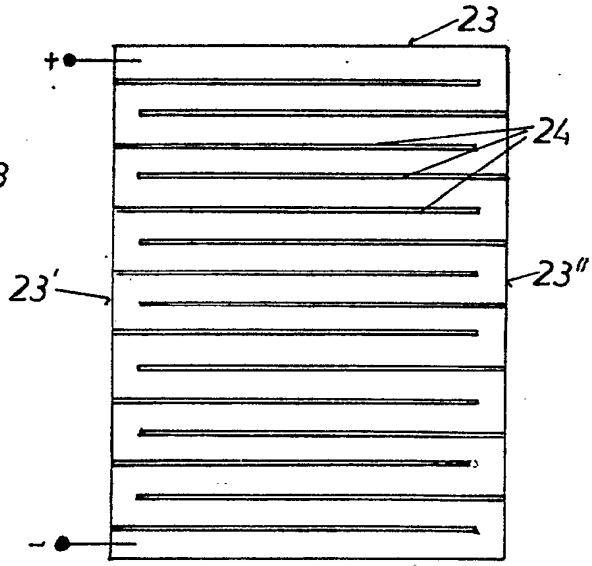

Fig. 11

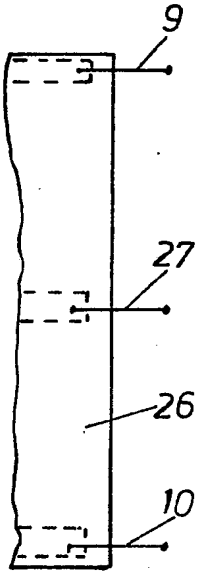

Fig. 13

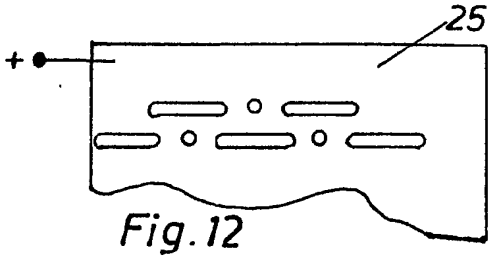

Fig. 12

SPECIFICATION

Mirror For Motor Vehicles

The invention relates to a heatable external mirror for motor vehicles, comprising an electrical heating element fitted to the rear side of the mirror and electrical connection lines connected thereto, in particular through the mirror mounting foot.

In known heatable external motor vehicle mirrors of the aforesaid type, the electrical heating element consists of a heating wire laid in multi-loop form, which has to be carefully laid and embedded for insulation purposes. This leads to a correspondingly high production and assembly cost, and requires a relatively complicated multi-layer construction for the mirror or its heating element region. In addition, the use of heating wire leads to ununiform heating of the mirror, and because of this a somewhat frequent strip pattern formation on its mirror surface.

The object of the invention is therefore to provide a heatable external mirror for motor vehicles without the aforesaid drawbacks, which is of simple structure and manufacture, and in particular allows a more uniform heating of the mirror free from strip formation. This object is attained according to the invention, in that the heating element consists of a wide surface heating foil or plate of an electrically conducting material, preferably which matches the mirror contour. By this means, the heatable external mirror can be more simply and cheaply manufactured and in particular can be more uniformly heated.

It has proved particularly advantageous if the heating foil or plate consists of electrically conducting rubber or another elastomer, for example mixed with carbon black. Such an electrically conducting rubber plate can be easily cemented on to the rear side of the mirror, and can be provided on its opposing sides, in particular its shorter sides, with contact strips for electrical connection. In this manner, an overall uniform mirror heating can be obtained for the smallest possible manufacture and assembly cost, and the cemented rubber plate has the additional advantage of forming a sufficient protection against shattering, because it holds back or impedes the shattering of the glass part of the mirror should it burst. Such an electrically conducting rubber plate can be assembled without difficulty by merely cementing it on to the rear side of the mirror, particularly if the rubber plate is provided with a self-adhesive layer which becomes exposed by a pull-off layer.

According to a further characteristic of the invention, the heating foil can consist also of a metal or a metallised plastics or paper foil, which is cemented on to the rear side of the mirror. In the case of the latter foil, it is desirable to provide it with mutually staggered separation slots for increasing its electrical resistance. These slots can extend parallel to each other to form a meander-shaped heating system, each slot alternately extending as far as the opposing side edges of the metal or metallised plastics or paper foil. For the same purpose, the metal or metallised plastics or paper foil can also be slotted in the form of a perforated sieve. These embodiments of the heating foil also provide a sufficient protection against shattering if the glass part of the mirror bursts.

The adhesive used for fixing the heating foil or plate to the rear side of the mirror preferably consists of a thermally enduring adhesive, which can be thermosetting or self-adhesive as stated, and possesses the necessary resistance to temperature.

The metal reflecting layer present on the rear side of the glass part of the mirror, and/or the metal layer which covers the rear side of the reflecting layer can serve as the heating foil or plate, corresponding contact strips being fitted on its opposing sides, according to the invention, for the electrical connections. It has been surprisingly found that these metal layers which are already present can be used as electrical heating elements, in particular if they are heated electrically by way of a correspondingly chosen series resistor.

Finally, according to the invention, a third electrical connection line is provided in the middle between the electrical connection lines present on the opposing sides of the heating foil or plate, for connection to a 12 or 24 Volt vehicle battery at choice.

The drawing shows a number of embodiments of the external mirror for motor vehicles according to the invention, wherein:

Figures 1 to 3 show a first embodiment in plan view and section on the lines II—II and III—III of Figure 1,

Figures 4 to 6 show a second embodiment in plan view and section on the lines V—V and VI—VI of Figure 4,

Figure 7 is a diagrammatic section through a third embodiment of a mirror,

Figure 8 is a partial plan view of the heating foil present in Figure 7,

Figures 9 and 10 are further embodiments of the mirror shown in section,

Figure 11 is a plan view of the heating plate provided with separation slots used in the embodiment shown in Figure 10,

Figure 12 is a partial plan view of a heating plate slotted with sieve-type perforations, and

Figure 13 is a partial plan view of a heating plate or foil with three electrical connection lines.

The external motor vehicle mirror shown in Figures 1 to 3 comprises a frame-shaped mirror mounting or enclosure 1 of plastics, which is fitted by way of the mounting foot 2 to a corresponding position on the vehicle body or door frame. The mirror glass 3 is fitted into the frame-shaped enclosure 1, and its rear side is correspondingly metallised, i.e. carries a mostly vapour-deposited metal reflecting layer 4, the rear side of which is mostly covered by a further metal layer. The electrically conducting plate 6, e.g. of

rubber mixed with carbon black and forming a corresponding heating resistor, is cemented thereon by means of the adhesive coating 5. U-shaped contact strips 7, 8 are fitted on to the opposing narrower sides of the rubber plate 6, so that their shorter arms also grip the edges of the mirror glass 3, and are connected to corresponding electrical connection lines 9 and 10, which pass through the mirror mounting foot 2 and are connected to the vehicle battery by way of a switch, not shown.

In the case of the embodiment shown in Figures 4 to 6, an electrically conducting plate 6 of rubber also acts as the electrical heating element for the illustrated external motor vehicle mirror, and is cemented to the rear side of the mirror by way of the coating 5. As in this case the mirror frame enclosure 1' and its mounting foot 2' are of metal, the conducting rubber plate 6 is made somewhat shorter at its edges than the mirror glass 3 or its metal reflecting layer 4, and is insulated electrically against the mirror frame enclosure 1' by an insulating layer which also covers its contact strips 7, 8. The electrical conductivity of the rubber plate 6 can be controlled by suitably proportioned addition of for example carbon black or graphite, so that the required heating power is obtained when the lines 9, 10 are connected to the vehicle battery. The important aspect here is that because of the wide-surface matching of the conducting rubber plate 6 to the mirror contour, an overall uniform heating of the mirror is obtained, with the result that there is no strip pattern formation. In addition, the cemented rubber plate forms a good protection against shattering.

In the embodiment illustrated in Figures 7 and 8, the wide-surface heating element is in the form of a plastics or paper foil 13 provided with a metal coating 12, e.g. of copper or aluminium, and which is cemented on to the rear side of the mirror glass 3 or its reflecting layer 4 by means of the adhesive coating 14. The corresponding contact strips are indicated by 15 and 16, and are connected to the electrical connection lines 9, 10.

Figure 9 is a diagrammatic section through an external mirror which is built up in the conventional manner from a number of layers, namely the mirror glass 3, its reflecting layer 4, the metal layer 17 which covers this latter, and the two covering varnish layers 18 and 19. After removing the preferably shorter opposing edge portions of the varnish layers 18, 19, the conducting contact strips 20, 21 are fitted on to the metal cover layer 17, e.g. by soldering, the exposed edges then being desirably filled in by a suitable filler 22. In this case, the metal cover layer 17 and the reflecting layer 4 which faces it serve as the wide-surface heating element. These heat conducting layers are connected, possibly by way of a series resistor of suitable size, to the vehicle battery by way of the contact strips 20, 21 and the electricity connection lines 9, 10 connected thereto.

In the embodiment shown in Figures 10 and 11, the wide-surface heating element cemented on to the rear side of the mirror or on to its reflecting layer 4 is in the form of a metal plate 23 of a suitable electrically conducting material, which has its electrical resistance increased by mutually staggered parallel separation slots 24, each of which extend alternately into the opposing side edges 23-3, 23'' of the metal plate or foil 23. This gives rise to a meander-shaped heating coil system, which makes possible a sufficiently uniform heating of the mirror. Instead of the metal plate 23 provided with the separation slots 24, the metal or metallised plastics or paper foil 25 with perforated sieve-type slots shown in Figure 12 can be used.

In the case of the wide-surface heating element 26 shown partly in plan view in Figure 13, and which can consist of conducting rubber or of a metal or metallised plastics or paper foil, a third electrical connection line 27 is provided in addition to, and in a middle position between, the electrical connection lines 9, 10 present on its opposing sides, so that connection can be made either to a 12 or 24 Volt vehicle battery at choice. Thus in the case of a 24 Volt battery, only the electrical connection lines 9, 10 are connected, whereas if a 12 Volt battery is available, the central electrical connection line 27 is additionally so connected that between this latter and the two other electrical connection lines there is a 12 Volt potential difference present for each, and consequently in both cases the same heating power can be obtained.

Claims

1. A heatable external mirror for motor vehicles, comprising an electrical heating element fitted to the rear side of the mirror and electrical connection lines connected thereto, in particular through the mirror mounting foot, characterised in that the heating element consists of a wide surface heating foil or plate (6 or 12, 17, 23 or 25) of an electrically conducting material, which matches the mirror contour.

2. An external mirror as claimed in claim 1, characterised in that the heating foil or plate consists of electrically conducting rubber (6) or another elastomer, for example mixed with carbon black.

3. An external mirror as claimed in claims 1 and 2, characterised in that the electrically conducting rubber plate (6) is cemented on to the rear side of the mirror, and is provided on its opposing sides, in particular on its shorter sides, with contact strips (7, 8) for the electrical connection lines (9, 10).

4. An external mirror as claimed in claim 1, characterised in that the heating foil consists of a metal foil (23, 25) or a metallised plastics or paper foil (12) cemented on to the rear side of the mirror.

5. An external mirror as claimed in claim 4, characterised in that the metal or metallised plastics or paper foil (23, 25) is provided with mutually staggered separation slots (24) for

increasing its electrical resistance.

6. An external mirror as claimed in claim 5, characterized in that the separation slots (24) extend parallel to each other to form a meander-shaped heating system, each slot alternately extending into the opposing side edges (23', 23'') of the metal or metallised plastics or paper foil (23).

7. An external mirror as claimed in claim 5 characterised in that the metal or metallised plastics or paper foil (25) is slotted in the form of a perforated sieve.

8. An external mirror as claimed in one or more of claims 1 to 7, characterised in that the adhesive used for fixing the heating foil or plate (6 or 12, 23 or 25) to the rear side of the mirror consists of a thermally enduring adhesive.

9. An external mirror as claimed in one of claims 1 to 7, characterised in that the metal reflecting layer (4) present on the rear side of the mirror glass (3) and/or the metal layer (17) which covers the rear side of the reflecting layer serves as the heating foil or plate, corresponding contact strips (20, 21) being fitted on its opposing sides for the electrical connection lines (9, 10).

10. An external mirror as claimed in one of claims 1 to 9, characterised in that a third electrical connection line (27) is provided additionally in the middle between the electrical connection lines (9, 10) present on the opposing sides of the heating foil or plate (6 or 12, 23, 25 or 26) for connection to a 12 or 24 Volt vehicle battery at choice.

11. A heatable mirror suitable for use in or on a motor vehicle, having a substantially two-dimensional electrical heating element substantially parallel to and against the reflecting surface.

12. A mirror according to claim 11, in which the heating element is substantially the same size and shape as the reflecting surface.

13. A mirror according to claim 11, substantially as herein described with reference to the accompanying drawing.

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